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2 2 ' BINOMIAL REDUNDANT RELIABILITY WITH EXPONENTIAL OR WEIBULL FAILURE DISTRIBUTION
  (BINWEIB.BAS)
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4 8 CLS
5 9 Print
6 10 Print " BINOMIAL REDUNDANT RELIABILITY WITH EXPONENTIAL OR WEIBULL FAILURE
  DISTRIBUTION (BINWEIB.BAS) "
7 11 Print
8 12 Print " ORIGINAL DATE: Circa 1986"
9 14 Print " REVISION DATE: October 29, 2020"
10 16 Print " AUTHOR: Phil Rutherford (www.philrutherford.com) "
11 18 Print " RUN DATE: ";Date$;
12 19 Print " (DD-MM-YYYY)
13 20 Print " RUN TIME: ";TIME$
14 21 Print " RUN WITH MMBASIC.EXE (www.mmbasic.com) "
15 22 Print
16 24 Input " MINIMUM NUMBER OF OPERATING UNITS REQUIRED ";M
17 26 Input " MAXIMUM NUMBER OF REDUNDANT UNITS ";N
18 28 Input " EXPONENTIAL OR WEIBULL FAILURE DISTRIBUTION (E/W) ";OPT$
19 30 If OPT$="E" Or OPT$="e" Then Input " UNIT FAILURE RATE (PER
  HOUR) ";LAMDA
20 31 If OPT$="W" Or OPT$="w" Then Print " WEIBULL ALPHA > 0 AND < 1 CONCAVE DECREASING
  FAILURE RATE"
21 32 If OPT$="W" Or OPT$="w" Then Print " WEIBULL ALPHA = 1 CONSTANT FAILURE
  RATE (EXPONENTIAL DISTRIBUTION) "
22 33 If OPT$="W" Or OPT$="w" Then Print " WEIBULL ALPHA > 1 AND < 2 CONVEX INCREASING
  FAILURE RATE"
23 34 If OPT$="W" Or OPT$="w" Then Print " WEIBULL ALPHA = 2 LINEAR INCREASING
  FAILURE RATE (RAYLEIGH DISTRIBUTION) "
24 35 If OPT$="W" Or OPT$="w" Then Print " WEIBULL ALPHA > 2 CONCAVE INCREASING
  FAILURE RATE"
25 36 If OPT$="W" Or OPT$="w" Then Input " WEIBULL
  ALPHA ";ALPHA
26 37 If OPT$="W" Or OPT$="w" Then Print " WEIBULL BETA > 0 (= 1 / CONSTANT FAILURE RATE
  IF ALPHA = 1) "
27 38 If OPT$="W" Or OPT$="w" Then Input " WEIBULL BETA >
  0 ";BETA
28 40 Input " MISSION TIME (HOURS) ";T
29 45 PRINT
30 50 If OPT$="E" Or OPT$="e" Then RNOFAIL=Exp(-1*M*LAMDA*T)
31 55 If OPT$="W" Or OPT$="w" Then RNOFAIL=Exp(-1*M*(T/BETA)^ALPHA)
32 60 If OPT$="E" Or OPT$="e" Then Q=1-Exp(-1*LAMDA*T)
33 65 If OPT$="W" Or OPT$="w" Then Q=1-Exp(-1*(T/BETA)^ALPHA)
34 70 If OPT$="W" Or OPT$="w" Then LAMDA = (ALPHA/BETA)*(T/BETA)^(ALPHA-1)
35 999 '-----
36 1000 'SCREEN PRINT RESULTS
37 1001 '-----
38 1002 Print " BINOMIAL RELIABILITY RESULTS"
39 1001 Print
40 1005 If OPT$="E" Or OPT$="e" Then Print " EXPONENTIAL FAILURE DISTRIBUTION" Else Print
  " WEIBULL FAILURE DISTRIBUTION"
41 1010 Print " FOR";M;" UNITS REQUIRED AND ZERO TO";N;" REDUNDANT UNITS AVAILABLE"
42 1020 If OPT$="E" Or OPT$="e" Then Print " UNIT FAILURE RATE =";LAMDA;" PER HOUR
  (EXPONENTIAL) "
43 1022 If OPT$="W" Or OPT$="w" Then Print " UNIT FAILURE RATE AT MISSION TIME (T) IS
  (A/B)*(T/B)^(A-1) =";(ALPHA/BETA)*(T/BETA)^(ALPHA-1);" PER HOUR (WEIBULL) "
44 1025 If OPT$="W" Or OPT$="w" Then Print " ALPHA (A) =";ALPHA
45 1027 If OPT$="W" Or OPT$="w" Then Print " BETA (B) =";BETA
46 1030 Print " MISSION TIME =";T;" HOURS"
47 1031 Print
48 1032 Print " SINGLE UNIT RELIABILITY IS";1-Q;TAB(71);"Pr(= 1 / 1 .S) "

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49 1033 Print
50 1035 Print " RELIABILITY OF";M" OPERATING AND 0 REDUNDANT UNITS
IS";RNOFAIL;TAB(71);"Pr(=>";M;" /";M;" .S) "
51 2080 SUM=1
52 2090 For Y=1 To N
53 2100 NUM=Y
54 2105 GOSUB 4210
55 2110 YFAC=I
56 2120 PROD=1
57 2130 For L=1 To Y
58 2132 PROD=PROD*(Y-L+M)
59 2135 Next L
60 2140 COEF = PROD/YFAC
61 2150 SUM=SUM+COEF*Q^Y
62 2160 R=RNOFAIL*SUM
63 2170 Print " RELIABILITY OF";M" OPERATING AND";Y;" REDUNDANT UNITS
IS";R;TAB(71);"Pr(=>";M;" /";M+Y;" .S) "
64 2180 Next Y
65 3200 End
66 4195 '-----
67 4200 'SUBROUTINE FOR FACTORIALS
68 4205 '-----
69 4210 I=1
70 4220 For J=1 To NUM
71 4230 I=I*J
72 4235 Next J
73 4240 Return

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